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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Preparing Activity: KSC

NASA/KSC-05 51 00.00 98 (April 2006)

Superseding
NASA/KSC-05511 (July 2003)

References are NOT in agreement with UMRL dated 01 April 2006

Revised throughout - changes not indicated by CHG tags
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SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 51 00.00 98

METAL STAIRS

04/06

-- End of Section Table of Contents --

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SECTION 05 51 00.00 98

METAL STAIRS
04/06

****
NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers steel stair systems which are not a part of any other metals system of the specification.

Only steel pan stairs are included in this section. Other types of steel stair treads and riser systems must be specified to suit the project requirements.

Associated work found in Division 5 includes:

Structural steel

Miscellaneous metal

Handrails and railings

Ornamental railings

Installation of inserts and anchorage devices

Drawings must include:

The location and extent of steel stairs with adequately dimensioned plans, elevations, sections, and details

Relationship of stairs to other building components

Material types and specific items coordinated with specification terminologies

Anchorage and connection details, including size, type and spacing of fasteners and welded connections

Brackets are used in the text to indicate designer choices or locations where text must be supplied by

the designer.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel

ASME INTERNATIONAL (ASME)

ASME B18.21.1	(1999; R 2005) Lock Washers (Inch Series)
ASME B18.21.2M	(1999; R 2005) Lock Washers (Metric Series)
ASME B18.22.1	(1965; R 1990) Plain Washers
ASME B18.22M	(1981; Rev 1990) Metric Plain Washers
ASME B36.10M	(2004) Welded and Seamless Wrought Steel Pipe

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2005a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A 108	(2003) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished

ASTM A 123/A 123M	(2002) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	(2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 27/A 27M	(2005) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A 283/A 283M	(2003) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A 307	(2004) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 36/A 36M	(2005) Standard Specification for Carbon Structural Steel
ASTM A 47/A 47M	(2004) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A 475	(1989) Zinc-Coated Steel Wire Strand
ASTM A 48/A 48M	(2003) Standard Specification for Gray Iron Castings
ASTM A 501	(2001) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A 512	(1996; R 2001) Standard Specification for Cold-Drawn Buttweld Carbon Steel Mechanical Tubing
ASTM A 526/A 526M	(1990) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process; Commercial Quality
ASTM A 53/A 53M	(2004a) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 568/A 568M	(2005) Standard Specifications for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
ASTM A 569/A 569M	(1998) Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot Rolled sheet and Strip Commercial Quality
ASTM A 570/A 570M	(1998) Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled

ASTM A 575	(2002) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
ASTM A 653/A 653M	(2004a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(2004) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

JOHN F. KENNEDY SPACE CENTER (KSC)

KSC-SPEC-Z-0004	(Rev C; 1989) Welding, Structural, Carbon Steel, Stainless Steel, Low Alloy Steel, and Aluminum Alloys

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531	(2000) Metal Bar Grating Manual

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS FF-B-561	(Rev C) Bolts, (Screw), Lag
FS FF-B-588	(Rev D) Bolt, Toggle; and Expansion Sleeve, Screw
FS FF-S-111	(Rev D; Am 1) Screw, Wood
FS FF-S-325	(Int Amd 3) Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)
FS FF-S-92	(Rev B; Am 1) Screw, Machine: Slotted, Cross-Recessed or Hexagon Head
FS QQ-F-461	(Rev C; Am 1) Floor Plate, Steel, Rolled

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	(2001) Occupational Safety and Health Standards

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not

complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fabrication drawings for the following items shall be in accordance with the paragraph entitled, "Fabrication, General," of this section.

Metal Stairs
Iron and Steel Hardware
Structural Steel Plates, Shapes, and Bars
Structural Steel Tubing
Hot-Rolled Carbon Steel Sheets and Strips
Cold Finished Steel Bars
Hot-Rolled Carbon Steel Bars
Cold-Rolled Carbon Steel Sheets
Galvanized Carbon Steel Sheets
Cold-Drawn Steel Tubing
Gray Iron Castings
Malleable Iron Castings
Paint Materials
Anchorage Devices

Installation drawings shall include the following additional information:

Metal Stair Assemblies

SD-03 Product Data

Manufacturer's catalog data shall include two copies of

manufacturers specifications, load tables, dimension diagrams, and anchor details for the following items:

Steel Pipe
Steel Wire Rope
Concrete Inserts
Anchorage Devices
Steel Pan Stairs

SD-07 Certificates

Certificates for welder qualifications shall be in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

1.3 QUALIFICATIONS FOR WELDING WORK

Welder qualifications shall be submitted and certified by tests in accordance with KSC-SPEC-Z-0004. If a test weld fails to meet requirements, an immediate retest of two test welds shall be made and each test weld shall pass. Failure in the immediate retest will require that the welder be retested after further practice or training and that a complete new set of test welds be made.

1.4 DRAINAGE HOLES

Adequate drainage holes shall be drilled to eliminate water traps. The hole diameter (preferably 13 millimeter) 1/2 inch) and location shall be shown on the shop drawing and subject to the approval of the Contracting Officer. The hole size and location shall not affect structural integrity.

1.5 GENERAL REQUIREMENTS

Installation drawings shall include the following information:

Plans and elevations at not less than 25 millimeter to 300 millimeter 1 inch to 1 foot scale.

Details of sections and connections at not less than 75 millimeter to 300 millimeter 3 inches to 1 foot scale.

Setting drawings, diagrams, templates for installation of anchorages, including concrete inserts, anchor bolts, and miscellaneous metal items having integral anchors.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Items shall be preassembled in the shop to the greatest extent possible. Units shall be disassembled only to the extent necessary for shipping and handling limitations. Units shall be clearly marked for reassembly and coordinated installation.

For the fabrication of work exposed-to-view, only materials which are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness, shall be used. Blemishes shall be removed by grinding, or by welding and grinding, prior to cleaning, treating, and application of surface finishes including zinc coatings.

****
NOTE: Select materials from the following to suit project. Delete those not required.
****

2.2 STRUCTURAL STEEL PLATES, SHAPES, AND BARS

Structural-size shapes and plates, except plates to be bent or cold-formed, shall conform to ASTM A 36/A 36M.

Steel plates to be bent or cold-formed shall conform to ASTM A 283/A 283M, Grade C.

Steel bars and bar-size shapes shall conform to ASTM A 36/A 36M.

2.3 STRUCTURAL STEEL TUBING

****
NOTE: ASTM A 501, includes square, rectangular, round, and special shaped structural steel tubing.
****

Structural steel tubing, hot-formed, welded or seamless, shall conform to ASTM A 501.

2.4 HOT-ROLLED CARBON STEEL BARS

Bars, and bar-size shapes, shall conform to ASTM A 575, grade as selected by the fabricator.

2.5 COLD-FINISHED STEEL BARS

Bars shall conform to ASTM A 108, grade as selected by the fabricator.

2.6 HOT-ROLLED CARBON STEEL SHEETS AND STRIPS

Sheets and strips shall conform to ASTM A 568/A 568M and ASTM A 569/A 569M, pickled and oiled.

2.7 COLD-ROLLED CARBON STEEL SHEETS

Sheets shall conform to the requirements of ASTM A 1008/A 1008M.

2.8 GALVANIZED CARBON STEEL SHEETS

Sheets shall conform to ASTM A 526/A 526M, with galvanizing conforming to ASTM A 653/A 653M and ASTM A 924/A 924M.

2.9 COLD-DRAWN STEEL TUBING

Tubing shall conform to ASTM A 512, sunk drawn, butt welded, cold finished, and stress relieved.

2.10 GRAY IRON CASTINGS

Castings shall conform to ASTM A 48/A 48M, Class 30.

2.11 MALLEABLE IRON CASTINGS

Castings shall conform to ASTM A 47/A 47M, grade as selected.

2.12 WROUGHT IRON PIPE

Pipe shall conform to ASME B36.10M, black finish unless galvanizing is required; standard weight unless otherwise indicated or specified.

2.13 STEEL PIPE

Pipe shall conform to ASTM A 53/A 53M, type as selected, Grade A; black finish unless galvanizing is required; standard weight (Schedule 40) unless otherwise indicated or specified.

2.14 STEEL WIRE ROPE

Steel wire rope shall conform to ASTM A 475, zinc-coated steel wire strand; size and number of wires as shown. "Common" grade with Class B zinc coating shall be provided unless otherwise shown or specified.

****
NOTE: Select anchors from the following as required. Inserts must be used for fastening steel stair items to cast-in-place concrete construction subjected to direct pullout loadings such as shelf angles and supports attached to concrete slab ceilings. Locations of inserts must be indicated.
****

2.15 CONCRETE INSERTS

Threaded-type concrete inserts shall consist of galvanized ferrous castings, internally threaded to receive 19 millimeter 3/4 inch diameter machine bolts; either malleable iron conforming to ASTM A 47/A 47M or cast steel conforming to ASTM A 27/A 27M, hot-dip galvanized in accordance with ASTM A 153/A 153M.

Wedge-type concrete inserts shall consist of galvanized box-type ferrous castings designed to accept 19 millimeter 3/4 inch diameter bolts having special wedge-shaped heads; they shall be either malleable iron conforming to ASTM A 47/A 47M or cast steel conforming to ASTM A 27/A 27M and hot-dip galvanized in accordance with ASTM A 153/A 153M.

Carbon steel bolts having special wedge-shaped heads, nuts, washers, and shims shall be provided and galvanized in accordance with ASTM A 153/A 153M.

Slotted-type concrete inserts shall consist of galvanized 3 millimeter 1/8 inch thick pressed steel plate conforming to ASTM A 283/A 283M; they shall be of box-type welded construction with slot designed to receive 19 millimeter 3/4 inch diameter square head bolt with knockout cover; and shall be hot-dip galvanized in accordance with ASTM A 123/A 123M.

2.16 MASONRY ANCHORAGE DEVICES

****
NOTE: Masonry anchorage devices shall only be used for fastening steel stair items to solid masonry and concrete when the anchor is not subjected to pullout

loads or vibration in shear loads.

Delete inapplicable paragraphs.

****

Masonry anchorage devices shall consist of expansion shields complying with FS FF-S-325 as follows:

Lead expansion shields shall be provided for machine screws and bolts 6 millimeter1/4 inch and smaller; head-out embedded nut type, single unit class, Group I, Type 1, Class 1.

Lead expansion shields shall be provided for machine screws and bolts larger than 6 millimeter in size; head-out embedded nut type, multiple unit class, Group I, Type 1, Class 2.

Bolt anchor expansion shields shall be provided for lag bolts; zinc-alloy, long shield anchors class, Group II, Type 1, Class 1.

Bolt anchor expansion shields shall be provided for bolts; closed-end bottom bearing class, Group II, Type 2, Class 1.

****

NOTE: Delete the following paragraph if not required.

Toggle bolts must be used for anchoring steel stair items to hollow masonry and stud partitions.

****

Toggle bolts shall be tumble-wing type, conforming to FS FF-B-588, type, class, and style as required.

2.17 FASTENERS

Zinc-coated fasteners shall be galvanized in accordance with ASTM A 153/A 153Mand shall be used for exterior applications or where built into exterior walls or floor systems. Select fasteners for the type, grade, and class required for the installation of steel stair items.

Standard bolts and nuts shall be regular hexagon-head type conforming to ASTM A 307, Grade A.

Lag bolts shall be square-head type conforming to FS FF-B-561.

Machine screws shall be cadmium-plated steel conforming to FS FF-S-92.

Wood screws shall be flat head carbon steel conforming to FS FF-S-111.

Plain washers shall be round, general-assembly-grade carbon steel conforming to ASME B18.22M ASME B18.22.1.

Lock washers shall be helical spring type carbon steel conforming to ASME B18.21.2M ASME B18.21.1.

2.18 PAINT

Paint and Paint Materials shall conform to the requirements of Section 09 97 13.00 40COATINGS FOR STEEL.

2.19 FABRICATION, GENERAL

2.19.1 Workmanship

Iron and Steel Hardware materials of size and thicknesses indicated or, if not indicated, of required size and thickness shall be used to produce adequate strength and durability in finished product for intended use. Materials shall be worked to dimensions indicated on approved shop drawings, using proven details of fabrication and support. Type of materials indicated or specified shall be used for the various components of work.

Exposed work shall be formed true to line and level with accurate angles and surfaces and straight sharp edges. Exposed edges shall be eased to a radius of approximately 0.8 millimeter 1/32 inch unless otherwise indicated. Metal corners shall be bent to the smallest radius possible without causing grain separation or otherwise impairing the work.

Corners and seams shall be welded continuously and in accordance with the recommendations of AWS D1.1/D1.1M and KSC-SPEC-Z-0004. Exposed welds shall be ground smooth and flush to match and blend with adjoining surfaces.

Exposed connections shall be formed with hairline joints which are flush and smooth, using concealed fasteners wherever possible. Exposed fasteners of the type indicated shall be used or, if not indicated, Phillips flathead (countersunk) screws or bolts shall be used.

Anchorage of the type indicated shall be provided and coordinated with the supporting structure. Anchoring devices shall be fabricated and spaced as indicated and as required to provide adequate support for the intended use of the work.

Hot-rolled steel bars shall be used for work fabricated from bar stock unless work is indicated or specified to be fabricated from cold-finished or cold-rolled stock.

2.19.2 Galvanizing

Zinc coating conforming to the following standards shall be provided for those items indicated or specified to be galvanized using the hot-dip process after fabrication:

ASTM A 153/A 153M, for galvanizing of iron and steel hardware

ASTM A 123/A 123M, for galvanizing of rolled, pressed, and forged steel shapes, plates, bars and strip 3 millimeter 1/8 inch thick and heavier

ASTM A 123/A 123M, for galvanizing of assembled steel products

2.20 SHOP PAINTING

Steel stair work shall be shop painted except those members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and surfaces galvanized, unless otherwise specified in accordance with Section 09 97 13.00 40 COATINGS FOR STEEL.

2.21 STEEL PAN STAIRS

2.21.1 General

Welding shall be used for joining pieces together unless otherwise indicated or specified. Units shall be fabricated so that bolts and other fastenings do not appear on finish surfaces. Joints shall be made true and tight, and connections between parts shall be light-proof tight. Continuous welds shall be grounded smooth where exposed.

Stair units shall be constructed to sizes and arrangements as indicated. Entire assembly shall be constructed to support a minimum live load of 5 kilopascal 100 psf unless otherwise indicated. Framing, hangers, columns, struts, clips, brackets, bearing plates, and other components shall be provided as required for the support of stairs and platforms.

2.21.2 Stair Framing

Strings of structural steel channels, or plates, or a combination thereof shall be fabricated as indicated. Closures for exposed ends of strings shall be provided.

Platforms of structural steel channel headers and miscellaneous framing members shall be constructed as indicated. Headers shall be bolted to strings and newels. Framing members shall be bolted to strings and headers.

2.21.3 Metal Pan Risers, Subtreads and Subplatforms

****
NOTE: Delete the following paragraph if uncoated steel sheets are not required.
****

Metal pans shall be formed of 2.8 millimeter 0.1046-inch thick structural steel sheets (12-gage), conforming to ASTM A 570/A 570M, Grade B. Pans shall be shaped to configuration indicated.

****
NOTE: Delete the following paragraph if galvanized steel sheets are not required.
****

Metal pans shall be formed of 2.8 millimeter 0.1084-inch thick galvanized structural steel sheets (12-gage), conforming to ASTM A 653/A 653M, Grade A, with zinc coating conforming to ASTM A 653/A 653M and ASTM A 924/A 924M. Shape of pans shall conform to configuration indicated.

Riser and subtread metal pans shall be constructed with steel angle supporting brackets, of size indicated, welded to strings. Metal pans shall be secured to brackets with rivets or welds.

Subplatform metal pans shall be secured to platform frames with welds.

2.21.4 Metal Safety Nosings

****
NOTE: Manufacturers offering products to comply with requirements include the following:

American Abrasive Metals Co.
American Mason Safety Tread Co.
Wooster Products, Inc.

****

Cast metal abrasive, nonskid type, shall be 100 millimeter 4 incheswide by full length of step between strings, unless otherwise indicated. Contractor shall fabricate to thickness, profile, and surface pattern as indicated. Each nosing shall be equipped with integral anchors for embedding in pan fill material and shall be spaced not more than 100 millimeter 4 inches from each end and not more than 375 millimeter 15 inches on center.

2.21.5 Steel Floor Plate Treads and Platforms

Raised pattern treads and platforms shall be steel floor plate conforming to FS QQ-F-461, Class I, fabricated from steel complying with ASTM A 36/A 36M. Pattern shall be provided as indicated or, if not indicated, as selected from manufacturer's standard patterns.

Treads shall be formed of 6 millimeter 1/4-inch thick steel floor plate with integral nosing and back edge stiffener. Steel supporting brackets shall be welded to strings and treads to brackets.

Platforms of steel floor plate shall be fabricated to thickness indicated. Nosing matching that on treads at landings shall be provided. Floor plates shall be secured to platform framing members with welds.

2.21.6 Floor Grating Treads and Platforms

****

NOTE: Select painted or galvanized finish; use galvanized treads and platforms for exterior.

****

Floor grating treads and platforms shall comply with NAAMM MBG 531Metal Bar Grating Manual. Pattern, spacing, and bar sizes shall be as indicated:

Galvanized finish shall conform to ASTM A 123/A 123M.

Painted finish shall be manufacturer's baked-on primer.

Grating treads shall be fabricated with steel plate nosing on one edge and with steel angle or steel plate carrier at each end for string connections. Treads shall be secured to strings with bolts.

Grating platforms shall be fabricated with nosing matching that on grating treads at landings. Toe-plates shall be provided at open-sided edges of floor grating to platform framing members.

2.21.7 Stair Railings and Handrails

Newels shall be fabricated from steel tubing. Newel caps shall be gray iron castings as indicated.

Steel pipe railings, consisting of top rail, intermediate rail, posts and handrails shall be provided at walls. Unless otherwise indicated, 40 millimeter 1-1/2 inch nominal size, standard weight, carbon steel pipe shall be provided and shall conform to ASTM A 53/A 53M, Type E or Type S,

Grade A. Railings shall conform to requirements of 29 CFR 1910, Section 23.

Posts, rails, and corners shall be joined by one of the following methods:

Flush-type steel railing fittings, welded and ground smooth, with railing splice locks secured with 10 millimeter 3/8-inch hexagonal-recessed-head setscrews

Mitered and welded joints made by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth, butt railing splices, reinforced by a tight-fitting interior sleeve not less than 150 millimeter 6 inches long

Railings may be bent at corners instead of joining, provided the bends are uniformly formed in jigs with cylindrical cross section of pipe maintained throughout the entire bend.

****
NOTE: Delete the following paragraph when removable railing sections are not required.
****

Removable railing sections shall be provided as indicated.

****
NOTE: Delete the following paragraph when kickplates are not required.
****

Kickplates shall be provided between railing posts where indicated, and shall consist of 3 millimeter 1/8 inch steel flat bars not less than 6 inches 150 millimeter high. Kickplates shall be secured as indicated.

****
NOTE: Select one of the following and delete others to suit project requirements. Delete all three if galvanizing is not required.
****

Exterior railings, including pipe, fittings brackets, fasteners, and other ferrous metal components shall be galvanized. Black steel pipe shall be provided for interior railings.

Exterior railings shall be provided and interior railings shall be galvanized where indicated, including pipe, fittings, brackets, fasteners, and other ferrous metal components. Black steel pipe shall be provided for interior railings not indicated as galvanized.

Railings, including pipe, fittings, brackets, fasteners, and other ferrous metal components shall be galvanized.

2.21.8 Soffit Clips

Clips shall be provided with holes for attaching metal furring for plastered soffits. Slips shall be spaced not more than 300 millimeter 12 inches on center and welded to stair treads and platforms as required.

2.21.9 Steel Framing For Concrete Stairs

Fabricated units shall be custom fitted to the dimensions and details indicated, and modified as required to fit actual dimensions of the supporting structure. Welded construction shall be used for fabrication of steel components. Contractor shall provide 2.0 millimeter 0.0785 inch (14-gage) thick steel risers, unless otherwise indicated. Components shall be arranged to receive finish materials as indicated.

PART 3 EXECUTION

3.1 STAIR RAILINGS AND HANDRAILS

Railings for Metal Stairs shall be adjusted prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Posts shall be spaced not more than 2400 millimeter 8 feet on center. Posts shall be plumbed in each direction. Posts and rail ends shall be secured to building construction as follows:

Anchor posts in concrete by means of pipe sleeves set and anchored into concrete. Provide sleeves of galvanized, standard weight, steel pipe, not less than 150 millimeter 6 inches long, and having an inside diameter not less than 13 millimeter 1/2 inch greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to the bottom of the sleeve; closure shall be of width and length not less than 25 millimeter 1 inch greater than the outside diameter of the sleeve. After posts have been inserted into sleeves, the annular space between post and sleeve shall be filled with molten lead or sulphur or a quick-setting hydraulic cement. Anchorage joint shall be covered with a round steel flange welded to the post.

Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.

Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into the wall construction with lead expansion shields and bolts.

Anchor rail ends to steel with steel oval or round flanges welded to tail ends and bolted to the structural steel members.

Handrails shall be secured to walls by means of wall brackets and wall return fitting at handrail ends. Brackets of malleable iron castings shall be provided, with not less than 75 millimeter 3-inch projection from the finish wall surface to the center of the pipe drilled to receive one 10 millimeter 3/8-inch bolt. Brackets shall be located not more than 1500 millimeter 60 inches on center. Wall return fittings of cast iron castings, flush-type, with the same projection as that specified for wall brackets shall be provided. Wall brackets and wall return fitting shall be secured to building construction as follows:

For concrete and solid masonry anchorage, use bolt anchor expansion shields and lag bolts.

For hollow masonry and stud partition anchorage, use toggle bolts having square heads.

3.2 WELDING

Welding for Metal Stair Assemblies shall be in accordance with KSC-SPEC-Z-0004 and the sections entitled "Workmanship" and "Technique" of AWS D1.1/D1.1M.

3.3 TOUCHUP PAINTING

****
NOTE: Delete the paragraph and heading if touchup painting is likely to be excluded from the steel stair erector's work.
****

Immediately after erection, the Contractor shall touch up paint field welds, bolted connections, and abraded areas of the shop paint. Touchup and repair shall be accomplished as soon as possible after the damage or installation has occurred. Surfaces shall be degreased, as required, prior to subsequent surface preparation. Degreasing shall be accomplished by steam cleaning or washing with a solution of trisodium phosphate in water followed by a fresh water rinse. Cuts, welds and large damaged areas shall be sandblasted to near white, (NACE No. 2). Blasting abrasive shall be sharp silica sand, size 1 to 420 micrometers 16 to 35 mesh. When sandblasting is prohibited or impractical, mechanical cleaning by needle gun or abrasive discs or wheels shall be used. Minor abrasions and scars where extensive rusting has not occurred shall be rendered clean and dry and touched up without further surface preparation. Repair coating shall be applied within 6 hours after surface preparation or before rusting or recontamination occurs. Touchup and repair material shall be the same inorganic zinc coating as applied in the shop. Application shall be by airless or conventional spray. Compressed air used for blasting and coating application shall be free of moisture and oil. Manufacturer's recommended procedures shall be followed and the requirements of Section 09 97 13.00 40 COATINGS FOR STEEL shall apply.

3.4 INSPECTION AND ACCEPTANCE PROVISIONS

3.4.1 Inspection and Tests

All material and workmanship shall be inspected by the Contractors quality control organization and shall meet the requirements set forth in this section. Material and workmanship will be subject to inspection and tests in the mill, shop, and field by Government inspectors. When materials and workmanship do not conform to the specification requirements, the Government reserves the right to reject material or workmanship, or both, at any time before final acceptance of the work.

3.4.2 Inspection of Welding

Inspection of welding shall be performed in accordance with KSC-SPEC-Z-0004.

-- End of Section --